IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

Kurt Ulmer et al.

Application No. 10/674,053

Filed: September 29, 2003

For: Fuel Cell Modulation and Temperature Control

Group Art Unit: 1795

Examiner: LEWIS, Ben

Confirmation No.: 2572

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal Brief under Rule 41.37 appealing the decision of the Primary Examiner dated **October 10, 2008** (the "final Office Action"). Each of the topics required by Rule 41.37 is presented herewith and is labeled appropriately.

I. Real Party in Interest

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. Related Appeals and Interferences

There are no appeals or interferences related to the present application of which the Appellant is aware.

III. Status of Claims

Claims 4, 31, 37, and 43 were canceled in the previous response. Claims 1, 3, 5-7, 24, 25, and 28-30, 32-36, 38-42, 44, and 45 are pending in the application and stand finally rejected. Accordingly, Appellant appeals from the final rejection of claims 1, 3, 5-7, 24, 25, and 28-30, 32-36, 38-42, 44, and 45, which claims are presented in the Appendix.

IV. Status of Amendments

No amendments have been filed subsequent to the final Office Action of **October 10, 2008**, from which Appellant takes this appeal.

V. Summary of Claimed Subject Matter

Appellant's application includes the following independent claims.

1. A fuel cell system (900), configured to control temperature of individual fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) of a plurality of fuel cells (910) by regulating serial vs. parallel configuration of the plurality of fuel cells (910) within the system (900), the system comprising:

first and second fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) of the plurality of fuel cells (910) capable of providing an electrical output (*Appellant's specification, para. [0063]*); and

a controller (920) configured for regulating temperature of the fuel cell system (900) by controlling serial vs. parallel configuration of the first and second fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) (*Appellant's specification, paras. [0063] and [0064]*), wherein the controller (920) is configured to identify whether more or less heat is required by the fuel cell system (900) (*Appellant's specification, paras. [0063] and [0064]*),

wherein the controller (920) increases heat production by increasing fuel consumption by switching to a more serial configuration and decreases heat production by decreasing fuel consumption by switching to a more parallel configuration (*Appellant's specification, paras. [0056], [0058], and [0068], and Table 1*), and

wherein the controller (920) is in communication with:

a switch circuit (800) comprising one or more switches (S_{P1}, S_{P2}, S_S) for arranging the electrical output of the first fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8)and the electrical output of the second fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) in parallel or series (*Appellant's specification, para. [0063]*); and

a temperature measurement circuit (T_1, T_2) capable of measuring the temperature of the first fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) or the second fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) and providing a signal to the controller (920) (*Appellant's specification, para. [0063]*);

wherein the controller (920) utilizes the switch circuit (800) to switch to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required (*Appellant's specification, para. [0063]*).

24. A fuel cell system (900) comprising:

means for supplying an excess amount of fuel to a multiple fuel cell system (900) (*Appellant's specification, paras. [0063] and [0065]*);

means for regulating the temperature of the fuel cell system (900) by controlling serial vs. parallel configuration of at least two fuel cells within the fuel cell system (900), wherein the means for regulating the temperature identifies whether more or less heat is required by the fuel cell system (900) (*Appellant's specification, para. [0063]*);

means for switching at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement (800) (*Appellant's specification, paras. [0063] and [0067]*); and

means for producing heat from at least some of the excess amount of fuel, wherein the means for producing heat switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system (900) (*Appellant's specification, paras. [0063] and [0067]*).

25. A fuel cell system (900) comprising:

means for supplying a substantially constant amount of fuel to a multiple fuel cell system (900) (*Appellant's specification, paras. [0056] and [0067]*);

means for switching at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement and maintaining a constant power output in each arrangement (800), wherein the means for switching (800) switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system (*Appellant's specification, para. [0063]*);

means for increasing EMF efficiency (*Appellant's specification, para. [0056] and [0067]*); and

means for reducing fuel efficiency (*Appellant's specification, para. [0056] and [0067]*).

28. A fuel cell system (900), configured to control temperature of the fuel cell system (900) by regulating a serial vs. a parallel configuration of cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) within the system (900), the fuel cell system (900) comprising:

a controller (920) configured to identify whether more or less heat is required by the fuel cell system (900), and to increase or decrease heat generated by the fuel cell system (900) by regulating a serial vs. a parallel configuration of cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) within the system, wherein the controller (920) iteratively measures fuel cell temperatures and iteratively reconfigures the fuel cell system (900) in a more parallel or more serial configuration in response to changes in temperature of the fuel cell system (900) (*Appellant's specification, paras. [0063] and [0064]*);

a temperature measurement circuit (T_1, T_2), in communication with the controller (920), configured to measure temperature of at least one fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) and to provide a signal to the controller (920) (*Appellant's specification, para. [0063]*); and

a switching circuit (800) to arrange the first and second fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) in a parallel or a series configuration in response to the controller (920) (*Appellant's specification, para. [0063]*);

wherein the controller (920) utilizes the switching circuit (800) to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required (*Appellant's specification, para. [0063]*).

34. A fuel cell system (900), configured to alternate between serial vs. parallel configurations of fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) within the system (900) based on heat required by the system (900), the fuel cell system (900) comprising:

means for controlling the fuel cell system (920), wherein the means for controlling (920) is configured to identify whether more or less heat is required by the fuel cell system (900), wherein the means for controlling (920) iteratively receives fuel cell temperature measurements and iteratively reconfigures the fuel cell system (900) in a more parallel or more serial configuration in response to temperature changes (*Appellant's specification, paras. [0063] and [0064]*);

means for measuring temperature (T_1, T_2) within one or more fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) and for communicating with the means for controlling (920) the fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) (*Appellant's specification, para. [0063]*); and

means for switching (800) the fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) between a parallel configuration and a serial configuration, in response to direction from the means for controlling (920) the fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) (*Appellant's specification, para. [0063]*);

wherein the means for controlling (920) the fuel cell (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) utilizes the means for switching (800) to switch the fuel cell system (900) to a more serial configuration if more heat is required and to switch the fuel cell system (900) to a more parallel configuration if less heat is required (*Appellant's specification, para. [0063]*).

40. A fuel cell system (900), configured to regulate temperature by alternating between increased and decreased heat production, the fuel cell system (900) comprising:

a temperature measurement circuit (T_1, T_2) configured to measure temperature of fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) within the system (900) (*Appellant's specification, para. [0063]*);

a switching circuit (800) to change an arrangement of the fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8) in either direction between a parallel configuration and a serial configuration (*Appellant's specification, para. [0063]*); and

a controller (920) configured to receive temperature measurement information from the temperature measurement circuit (T_1, T_2), to determine whether more or less heat is required by the fuel cell system (900), and to control the switching circuit (800) and the configuration of the fuel cells (FC_1, FC_2, FC_3, FC_4, FC_5, FC_6, FC_7, FC_8), wherein the controller (920) utilizes the switching circuit (800) to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required and wherein the controller (920) iterates in a cycle of measuring fuel cell temperatures and

reconfiguring the fuel cell system (900) in a more parallel or more serial configuration in response to changes in temperature of the fuel cell system (900) (*Appellant's specification, paras. [0063] and [0064]*).

VI. Grounds of Rejection to be Reviewed on Appeal

The final Office Action raised the following single rejection.

(1). Claims 1, 3-7, 24, 25, and 28-45 were rejected under 35 U.S.C. 103(a) and being unpatentable over U.S. Patent Application Publication No. 2003/0008184 to Ballantine et al. (hereinafter "Ballantine")

Accordingly, Appellant hereby requests review of this rejection in the present appeal.

VII. Argument

(1) Claims 1, 3-7, 24, 25, and 28-45 are patentable over Ballantine:

Claim 1:

Claim 1 recites:

> A fuel cell system, configured to control temperature of individual fuel cells of a plurality of fuel cells by regulating serial vs. parallel configuration of the plurality of fuel cells within the system, the system comprising:
>
> first and second fuel cells of the plurality of fuel cells capable of providing an electrical output; and
>
> a controller configured for regulating temperature of the fuel cell system by controlling serial vs. parallel configuration of the first and second fuel cells, wherein the controller is configured to identify whether more or less heat is required by the fuel cell system,
>
> ***wherein the controller increases heat production by increasing fuel consumption by switching to a more serial configuration and decreases heat production by decreasing fuel consumption by switching to a more parallel configuration***, and
>
> wherein the controller is in communication with:
>
> a switch circuit comprising one or more switches for arranging the electrical output of the first fuel cell and the electrical output of the second fuel cell in parallel or series; and
>
> ***a temperature measurement circuit capable of measuring the temperature of the first fuel cell or the second fuel cell*** and providing a signal to the controller;
>
> wherein the controller utilizes the switch circuit to ***switch to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required***.

(Emphasis added).

In direct contrast to claim 1, Ballantine fails to teach or suggest a fuel cell system including a controller wherein the controller increases heat production by increasing fuel consumption by switching to a more serial configuration, and decreases heat production by decreasing fuel consumption by switching to a more parallel configuration. To the contrary, Ballantine teaches the exact opposite.

Ballantine describes a "cogeneration fuel cell system" that "is operated among various modes **to balance heat and power demand signals**. In general, a fuel cell system is coupled

to a power sink and a heat sink, and a controller is adapted to respond to data signals from the power sink and the heat sink." (Ballantine, Abstract) (emphasis added). Ballantine teaches "generating a heat demand signal when the thermal parameter of the heat sink is below a predetermined level; and . . . selectively connecting at least two fuel cells in the fuel cell stack ***in parallel in response to the heat demand signal***. (Ballantine, para. [0015]) (emphasis added). Similar language is contained in paragraph [0129] of Ballantine as well.

Further, Ballantine teach connecting fuel cells in parallel in response to a heat demand signal (e.g. in order to increase heat within a system) throughout the Ballantine reference. For example, Ballantine teaches that

> [i]n a first operating mode, the sections of cells are connected in series, and ***in a second operating mode, at least two sections of cells are operated in parallel***. In general, the first and second operating modes will provide different operating efficiencies in terms of the amount of heat produced per unit power. For example, ***the second operating mode may produce more heat***.

(Ballantine, para. [0090]) (emphasis added).

Further, Ballantine teaches that "the method may include selectively electrically connecting fuel cells in a low efficiency mode (e.g., ***some cells in parallel rather than in series***) in response to a control signal (e.g., a heat demand signal as from a thermostat) ***to provide additional heat*** into a fuel cell stack coolant fluid." (Ballantine, para. [0095]) (emphasis added). Similar language is contained in paragraph [0097] of Ballantine as well.

Finally, Ballantine teaches that "a group of ***fuel cells*** generally ***produce a greater amount of waste heat when they are connected in parallel rather than in series***. One reason is that the cells generally operate at a lower efficiency in such a configuration, so that more waste heat is generated." (Ballantine, para. [0130]) (emphasis added).

In direct contrast to the teachings of Ballantine, claim 1 recites a controller that ***increases heat production*** by increasing fuel consumption by switching to a more ***serial***

configuration and ***decreases heat production*** by decreasing fuel consumption by switching to a more ***parallel configuration***. Thus, per claim 1, a parallel configuration of fuel cells results in a decrease in heat production, and not an increase in heat production as the Ballantine reference teaches.

Consequently, Ballantine ***teaches away*** from claim 1 by stating the exact opposite of that which is claimed. Appellant notes that a reference must be considered for all it teaches, including disclosures that teach away from the invention as well as disclosures that point toward the invention. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.* 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985).

The final Office Action concedes that Ballantine does not "specifically teach switching to a more serial [configuration] if more heat is required and switching to a more parallel configuration if less heat is required." (Final Office Action, p. 4). Nevertheless, the final Office Action further states that it would have been obvious to switch the fuel cell system of Ballantine in the same manner as claimed in the present application because "all the elements of applicant's claimed apparatus are present in the fuel cell system of Ballantine et al." (Final Office Action, pp. 4, and 15-16).

This argument has no support whatsoever in the prior art and is utterly pointless because the Ballantine reference itself teaches away from, and the exact opposite of, the claimed invention. It has been expressly held that it is improper to propose a modification of a prior art reference to make a rejection under § 103 where the prior art teaches away from the modification proposed. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). *See* MPEP § 2145.

Under the analysis required by Graham v. John Deere, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a fuel cell system, comprising a controller configured for regulating temperature of the fuel cell system, wherein the controller increases heat production by increasing fuel consumption by switching to a more serial configuration and decreases heat production by decreasing fuel consumption by switching to a more parallel configuration.

The differences between the cited prior art and the claimed subject matter are significant because such a configuration allows a fuel cell system to operate more efficiently. Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 1 under 35 U.S.C. § 103 and Graham.

Further, as recited in claim 1, a temperature measurement circuit capable of measuring the temperature of the first fuel cell or the second fuel cell is provided. In contrast, Ballantine fails to teach or suggest measurement of the temperature of a fuel cell. The final Office Action concedes that Ballantine teaches "that a controller is adapted to coordinate response to data signals from the power sink and the heat sink. As examples, such data signals from the heat sink may include a temperature indication or a heat demand signal (such as from a thermostat) . . . ." (Action, p. 2). Consequently, Ballantine teaches that the temperature of a fuel cell system is measured at a heat sink, and does not teach or suggest that the temperature

may be measured anywhere within the system other than at the heat sink. (Ballantine, paras. [0014], [0016], [0057]-[0058], [0070], and [0113]-[0114], for example).

However, as indicated in claim 1, the temperature of the fuel cells, themselves, are measured using a temperature measurement circuit that is capable of measuring the temperature of the first fuel cell or the second fuel cell. Thus, according to claim 1, the temperature of the fuel cells is directly measured. Ballantine does not teach or suggest measuring fuel cell temperatures directly.

Again, under the analysis required by Graham v. John Deere, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a temperature measurement circuit capable of measuring the temperature of a first fuel cell or a second fuel cell.

The differences between the cited prior art and the claimed subject matter are significant because direct measurement of a fuel cell allows for more precise measurements of heat transfer as opposed to measuring heat that has been transferred through one or more mediums. Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 1 under 35 U.S.C. § 103 and Graham.

Claim 28:

Claim 28 recites:

> A fuel cell system, configured to control temperature of the fuel cell system by regulating a serial vs. a parallel configuration of cells within the system, the fuel cell system comprising:
>
> a controller configured to identify whether more or less heat is required by the fuel cell system, and to increase or decrease heat generated by the fuel cell system by regulating a serial vs. a parallel configuration of cells within the system, wherein the controller iteratively measures fuel cell temperatures and iteratively reconfigures the fuel cell system in a more parallel or more serial configuration in response to changes in temperature of the fuel cell system;
>
> a temperature measurement circuit, in communication with the controller, configured to measure temperature of at least one fuel cell and to provide a signal to the controller; and
>
> a switching circuit to arrange the first and second fuel cells in a parallel or a series configuration in response to the controller;
>
> *wherein the controller utilizes the switching circuit to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required.*

(Emphasis added).

In contrast, as demonstrate above, Ballantine does not teach or suggest a fuel cell system like that recited in claim 28 “wherein the controller utilizes the switching circuit to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required.” To the contrary, Ballantine teaches away from this subject matter and actually teaches the exact opposite. For at least this reason, the rejection of claim 28 cannot be sustained.

Claim 34:

Claim 34 recites:

> A fuel cell system, configured to alternate between serial vs. parallel configurations of fuel cells within the system based on heat required by the system, the fuel cell system comprising:
>
> means for controlling the fuel cell system, wherein the means for controlling is configured to identify whether more or less heat is required by the fuel cell system, wherein the means for controlling iteratively receives fuel cell temperature

> measurements and iteratively reconfigures the fuel cell system in a more parallel or more serial configuration in response to temperature changes;
>
> means for measuring temperature within one or more fuel cells and for communicating with the means for controlling the fuel cell; and
>
> means for switching the fuel cells between a parallel configuration and a serial configuration, in response to direction from the means for controlling the fuel cell;
>
> *wherein the means for controlling the fuel cell utilizes the means for switching to switch the fuel cell system to a more serial configuration if more heat is required and to switch the fuel cell system to a more parallel configuration if less heat is required.*

(Emphasis added).

In contrast, as demonstrate above, Ballantine does not teach or suggest a fuel cell system like that recited in claim 34 "wherein the means for controlling the fuel cell utilizes the means for switching to switch the fuel cell system to a more serial configuration if more heat is required and to switch the fuel cell system to a more parallel configuration if less heat is required." To the contrary, Ballantine teaches away from this subject matter and actually teaches the exact opposite. For at least this reason, the rejection of claim 34 cannot be sustained.

<u>Claim 40:</u>

Claim 40 recites:

> A fuel cell system, configured to regulate temperature by alternating between increased and decreased heat production, the fuel cell system comprising:
>
> a temperature measurement circuit configured to measure temperature of fuel cells within the system;
>
> a switching circuit to change an arrangement of the fuel cells in either direction between a parallel configuration and a serial configuration; and

> a controller configured to receive temperature measurement information from the temperature measurement circuit, to determine whether more or less heat is required by the fuel cell system, and to control the switching circuit and the configuration of the fuel cells, *wherein the controller utilizes the switching circuit to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required* and *wherein the controller iterates in a cycle of measuring fuel cell temperatures and reconfiguring the fuel cell system in a more parallel or more serial configuration in response to changes in temperature of the fuel cell system.*

(Emphasis added).

In contrast, as demonstrate above, Ballantine does not teach or suggest a fuel cell system like that recited in claim 40 "wherein the controller utilizes the switching circuit to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required." To the contrary, Ballantine teaches away from this subject matter and actually teaches the exact opposite.

Additionally, Ballantine does not teach or suggest that "the controller iterates in a cycle of measuring fuel cell temperatures and reconfiguring the fuel cell system in a more parallel or more serial configuration in response to changes in temperature of the fuel cell system."

For at least these reasons, the rejection of claim 40 cannot be sustained.

<u>Claims 24 and 25:</u>

Claim 24 recites:

> A fuel cell system comprising:
>
> means for supplying an excess amount of fuel to a multiple fuel cell system;
>
> *means for regulating the temperature of the fuel cell system by controlling serial vs. parallel configuration of at least two fuel cells within the fuel cell system*, wherein the means for regulating the temperature identifies whether more or less heat is required by the fuel cell system;
>
> means for switching at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement; and

> means for producing heat from at least some of the excess amount of fuel, *wherein the means for producing heat switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system*.

(Emphasis added).

Similarly, claim 25 recites:

> A fuel cell system comprising:
> means for supplying a substantially constant amount of fuel to a multiple fuel cell system;
> means for switching at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement and maintaining a constant power output in each arrangement, *wherein the means for switching switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system*;
> means for increasing EMF efficiency; and
> means for reducing fuel efficiency.

(Emphasis added).

In contrast, Ballantine fails to teach or suggest a fuel cell system including a means for regulating the temperature of the fuel cell system or a means for switching at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement wherein a switch is made to a more serial configuration if more heat is required and a switch is made to a more parallel configuration if less heat is required by the fuel cell system.

Specifically, Ballantine describes a "cogeneration fuel cell system" that "is operated among various modes **to balance heat and power demand signals**. In general, a fuel cell system is coupled to a power sink and a heat sink, and a controller is adapted to respond to data signals from the power sink and the heat sink." (Ballantine, Abstract) (emphasis added). Ballantine teaches "generating a heat demand signal when the thermal parameter of the heat sink is below a predetermined level; and . . . selectively connecting at least two fuel cells in the fuel cell stack ***in parallel in response to the heat demand signal***. (Ballantine, para. [0015]) (emphasis added). Similar language is contained in paragraph [0129] of Ballantine as well.

Further, Ballantine teach connecting fuel cells in parallel in response to a heat demand signal (e.g. in order to increase heat within a system) throughout the Ballantine reference. For example, Ballantine teaches that

> [i]n a first operating mode, the sections of cells are connected in series, and ***in a second operating mode, at least two sections of cells are operated in parallel***. In general, the first and second operating modes will provide different operating efficiencies in terms of the amount of heat produced per unit power. For example, ***the second operating mode may produce more heat***.

(Ballantine, para. [0090]) (emphasis added).

Further, Ballantine teaches that "the method may include selectively electrically connecting fuel cells in a low efficiency mode (e.g., ***some cells in parallel rather than in series***) in response to a control signal (e.g., a heat demand signal as from a thermostat) ***to provide additional heat*** into a fuel cell stack coolant fluid." (Ballantine, para. [0095]) (emphasis added). Similar language is contained in paragraph [0097] of Ballantine as well.

Finally, Ballantine teaches that "a group of ***fuel cells*** generally ***produce a greater amount of waste heat when they are connected in parallel rather than in series***. One reason is that the cells generally operate at a lower efficiency in such a configuration, so that more waste heat is generated." (Ballantine, para. [0130]) (emphasis added).

In contrast, claims 24 and 25 recite a means for regulating temperature and means for switching, respectively, that switch to a more serial configuration if more heat is required and switch to a more parallel configuration if less heat is required by the fuel cell system. Thus, per claims 24 and 25, a parallel configuration of fuel cells results in a decrease in heat production, and not an increase in heat production as the Ballantine reference amply contends. In this regard, Ballantine ***teaches away*** from claim 1 by stating the exact opposite of claim 1.

The final Office Action concedes that Ballantine does not "specifically teach switching to a more serial [configuration] if more heat is required and switching to a more parallel configuration if less heat is required." (Final Office Action, pp. 12 and 14). The final Office Action further states that it would have been obvious to switch the fuel cell system of Ballantine in the same manner as claimed in the present application because "all the elements of applicant's claimed apparatus are present in the fuel cell system of Ballantine et al." (Final Office Action, pp. 12 and 14). This argument has no support whatsoever in the prior art and is utterly pointless because the Ballantine reference itself teaches away from, and the exact opposite of, the claimed invention. It has been expressly held that it is improper to propose a modification of a prior art reference to make a rejection under § 103 where the prior art teaches away from the modification proposed. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). *See* MPEP § 2145.

Under the analysis required by Graham v. John Deere, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a means for regulating the temperature of the fuel cell system or a means for switching at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement wherein a switch is made to a more serial configuration if more heat is required and a switch is made to a more parallel configuration if less heat is required by the fuel cell system.

The differences between the cited prior art and the claimed subject matter are significant because such a configuration allows a fuel cell system to operate more efficiently. Thus, the claimed subject matter provides features and advantages not known or available in

the cited prior art. Consequently, the cited prior art will not support a rejection of claim 1 under 35 U.S.C. § 103 and Graham.

Claims 6 and 7:

The rejection of claims 6 and 7 should not be sustained for at least the same reasons given above in favor of the patentability of independent claim 1. Further, claims 6 and 7 contain subject matter patentable over the Ballantine reference.

Specifically, claim 6 recites:

> The system of claim 1, wherein the controller causes the switch circuit to arrange the electrical output of the first fuel cell and the electrical output of the second fuel cell ***in parallel to increase electrical output efficiency of the first fuel cell and the second fuel cell***.

(Emphasis added).

Similarly, claim 7 recites:

> The system of claim 1, wherein the controller causes the switch circuit to arrange the electrical output of the first fuel cell and the electrical output of the second fuel cell ***in series to decrease electrical output efficiency of the first fuel cell and the second fuel cell***.

(Emphasis added).

In contrast, Ballantine fails to teach or suggest a controller that causes a first and second fuel cells to be electrically arranged in parallel to increase electrical output efficiency and cause the first and second fuel cells to be electrically arranged in series to increase electrical output efficiency. Similar to the argument above in connection with claim 1, the controller of Ballantine is not configured to cause a switch circuit to place two or more fuel cells in the parallel to increase electrical output efficiency. Specifically, Ballantine states the following:

> Without wishing to be bound by theory, a group of fuel cells generally produce a greater amount of waste heat when they are connected in parallel

> rather than in series. ***One reason is that the cells generally operate at a lower efficiency in [a parallel] configuration***, so that more waste heat is generated.

(Emphasis added).

Again, in contrast to Ballantine, the recitations of claims 6 and 7 are directed to the opposite of what Ballantine discloses. Specifically, the controller of claims 6 and 7 are configured to connect one or more fuel cells in parallel to increase electrical output efficiency thereof. Thus, the controller of claims 6 and 7 are fundamentally different from the controller of Ballantine in both form and function.

Under the analysis required by Graham v. John Deere, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a controller that causes a first and second fuel cells to be electrically arranged in parallel to increase electrical output efficiency and cause the first and second fuel cells to be electrically arranged in series to increase electrical output efficiency.

The differences between the cited prior art and the claimed subject matter are significant because the controller that acts in this manner provides for a more efficient fuel cell system by allowing for the electrical output efficiency to be modified depending on required power needs. Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claims 6 and 7 under 35 U.S.C. § 103 and Graham.

<u>Claims 38 and 39:</u>

The rejection of claims 38 and 39 should be reconsidered and withdrawn for at least the same reasons given above in favor of the patentability of independent claim 34. Further, claims 38 and 39 contain subject matter patentable over the Ballantine reference.

Specifically, claim 38 recites:

> The fuel cell system of Claim 34, wherein the means for controlling is configured to supply an excess amount of fuel to multiple fuel cells, to receive a temperature measurement from the temperature measurement circuit, to s***witch at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement*** using the switching circuit, ***and to thereby obtain heat from at least some of the excess amount of fuel***.

(Emphasis added).

Similarly, claim 39 recites:

> The fuel cell system of Claim 34, wherein the means for controlling is configured to supply a substantially constant amount of fuel to multiple cells within the fuel cell system, to ***switch at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement, and to thereby increase EMF efficiency and reduce fuel efficiency***.

(Emphasis added).

In contrast, Ballantine fails to teach or suggest a fuel cell system comprising means for controlling that is configured to either switch at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement using the switching circuit to obtain heat from at least some of the excess amount of fuel <u>**or**</u> switch at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement, to increase EMF efficiency and reduce fuel efficiency. Similar to the argument above in connection with claims 1, 6, and 7, the controller of Ballantine is not configured to cause a switch circuit to place two or more fuel cells in the parallel to increase electrical output efficiency. Specifically, Ballantine states the following:

> Without wishing to be bound by theory, a group of fuel cells generally produce a greater amount of waste heat when they are connected in parallel

> rather than in series. ***One reason is that the cells generally operate at a lower efficiency in [a parallel] configuration***, so that more waste heat is generated.

(Emphasis added).

Again, in contrast to Ballantine, the recitations of claims 38 and 39 recite the opposite of what Ballantine discloses. Specifically, the means for controlling of claims 38 and 39 are configured to connect one or more fuel cells in parallel to increase electrical output efficiency thereof. Thus, the means for controlling of claims 38 and 39 are fundamentally different from the controller of Ballantine in both form and function.

Under the analysis required by Graham v. John Deere, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Ballantine, did not include the claimed subject matter, particularly a fuel cell system comprising means for controlling that is configured to either switch at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement using the switching circuit to obtain heat from at least some of the excess amount of fuel or switch at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement, to increase EMF efficiency and reduce fuel efficiency.

The differences between the cited prior art and the claimed subject matter are significant because the controller that acts in this manner provides for a more efficient fuel cell system by allowing for the electrical output efficiency to be modified depending on required power needs. Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claims 38 and 39 under 35 U.S.C. § 103 and Graham.

In view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Rejection of **October 10, 2008** is respectfully requested.

Respectfully submitted,

DATE: February 9, 2009

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VIII. CLAIMS APPENDIX

1. (previously presented) A fuel cell system, configured to control temperature of individual fuel cells of a plurality of fuel cells by regulating serial vs. parallel configuration of the plurality of fuel cells within the system, the system comprising:

first and second fuel cells of the plurality of fuel cells capable of providing an electrical output; and

a controller configured for regulating temperature of the fuel cell system by controlling serial vs. parallel configuration of the first and second fuel cells, wherein the controller is configured to identify whether more or less heat is required by the fuel cell system,

wherein the controller increases heat production by increasing fuel consumption by switching to a more serial configuration and decreases heat production by decreasing fuel consumption by switching to a more parallel configuration, and

wherein the controller is in communication with:

a switch circuit comprising one or more switches for arranging the electrical output of the first fuel cell and the electrical output of the second fuel cell in parallel or series; and

a temperature measurement circuit capable of measuring the temperature of the first fuel cell or the second fuel cell and providing a signal to the controller;

wherein the controller utilizes the switch circuit to switch to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required.

2. (canceled)

3. (original) The system of claim 1, wherein the first fuel cell and the second fuel cell comprises solid oxide fuel cells.

4. (canceled)

5. (previously presented) The system of claim 1, wherein the controller is configured to receive the signal from the temperature measurement circuit and to arrange the electrical output of the first fuel cell and the electrical output of the second fuel cell in response thereto.

6. (previously presented) The system of claim 1, wherein the controller causes the switch circuit to arrange the electrical output of the first fuel cell and the electrical output of the second fuel cell in parallel to increase electrical output efficiency of the first fuel cell and the second fuel cell.

7. (previously presented) The system of claim 1, wherein the controller causes the switch circuit to arrange the electrical output of the first fuel cell and the electrical output of the second fuel cell in series to decrease electrical output efficiency of the first fuel cell and the second fuel cell.

8-23. (cancelled)

24. (previously presented) A fuel cell system comprising:

means for supplying an excess amount of fuel to a multiple fuel cell system;

means for regulating the temperature of the fuel cell system by controlling serial vs. parallel configuration of at least two fuel cells within the fuel cell system, wherein the means for regulating the temperature identifies whether more or less heat is required by the fuel cell system;

means for switching at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement; and

means for producing heat from at least some of the excess amount of fuel, wherein the means for producing heat switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system.

25. (previously presented) A fuel cell system comprising:

means for supplying a substantially constant amount of fuel to a multiple fuel cell system;

means for switching at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement and maintaining a constant power output in each arrangement, wherein the means for switching switches to a more serial configuration if more heat is required and switches to a more parallel configuration if less heat is required by the fuel cell system;

means for increasing EMF efficiency; and

means for reducing fuel efficiency.

26. (cancelled)

27. (cancelled)

28. (previously presented) A fuel cell system, configured to control temperature of the fuel cell system by regulating a serial vs. a parallel configuration of cells within the system, the fuel cell system comprising:

a controller configured to identify whether more or less heat is required by the fuel cell system, and to increase or decrease heat generated by the fuel cell system by regulating a serial vs. a parallel configuration of cells within the system, wherein the controller iteratively measures fuel cell temperatures and iteratively reconfigures the fuel cell system in a more parallel or more serial configuration in response to changes in temperature of the fuel cell system;

a temperature measurement circuit, in communication with the controller, configured to measure temperature of at least one fuel cell and to provide a signal to the controller; and

a switching circuit to arrange the first and second fuel cells in a parallel or a series configuration in response to the controller;

wherein the controller utilizes the switching circuit to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required.

29. (previously presented) The fuel cell system of Claim 28, wherein the controller alternates between increased heat production associated with a more serial configuration of the cells within the system and decreased heat production associated with a more parallel configuration of the cells within the system to provide fuel cell modulation and temperature control to the fuel cell system.

30. (previously presented) The fuel cell system of Claim 28, wherein the controller directs an excess supply of fuel to the system prior to identification of heat requirements of the fuel cells.

31. (canceled)

32. (previously presented) The fuel cell system of Claim 28, wherein the controller is configured to supply an excess amount of fuel to multiple fuel cells, to receive a temperature measurement from the temperature measurement circuit, to switch at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement using the switching circuit in response to the measured temperature, and to thereby produce heat from at least some of the excess amount of fuel.

33. (previously presented) The fuel cell system of Claim 28, wherein the controller is configured to supply an excess amount of fuel to multiple fuel cells, to switch at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement, and to produce heat from at least some of the excess amount of fuel.

34. (previously presented) A fuel cell system, configured to alternate between serial vs. parallel configurations of fuel cells within the system based on heat required by the system, the fuel cell system comprising:

means for controlling the fuel cell system, wherein the means for controlling is configured to identify whether more or less heat is required by the fuel cell system, wherein

the means for controlling iteratively receives fuel cell temperature measurements and iteratively reconfigures the fuel cell system in a more parallel or more serial configuration in response to temperature changes;

means for measuring temperature within one or more fuel cells and for communicating with the means for controlling the fuel cell; and

means for switching the fuel cells between a parallel configuration and a serial configuration, in response to direction from the means for controlling the fuel cell;

wherein the means for controlling the fuel cell utilizes the means for switching to switch the fuel cell system to a more serial configuration if more heat is required and to switch the fuel cell system to a more parallel configuration if less heat is required.

35. (previously presented) The fuel cell system of Claim 34, wherein the means for controlling is configured to switch fuel cells from a series electrical arrangement to a parallel electrical arrangement to increase EMF efficiency and reduce fuel efficiency.

36. (previously presented) The fuel cell system of Claim 34, wherein the fuel cells within the system comprise solid oxide fuel cells.

37. (canceled)

38. (previously presented) The fuel cell system of Claim 34, wherein the means for controlling is configured to supply an excess amount of fuel to multiple fuel cells, to receive a temperature measurement from the temperature measurement circuit, to switch at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement using

the switching circuit, and to thereby obtain heat from at least some of the excess amount of fuel.

39. (previously presented) The fuel cell system of Claim 34, wherein the means for controlling is configured to supply a substantially constant amount of fuel to multiple cells within the fuel cell system, to switch at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement, and to thereby increase EMF efficiency and reduce fuel efficiency.

40. (Previously Presented) A fuel cell system, configured to regulate temperature by alternating between increased and decreased heat production, the fuel cell system comprising:

a temperature measurement circuit configured to measure temperature of fuel cells within the system;

a switching circuit to change an arrangement of the fuel cells in either direction between a parallel configuration and a serial configuration; and

a controller configured to receive temperature measurement information from the temperature measurement circuit, to determine whether more or less heat is required by the fuel cell system, and to control the switching circuit and the configuration of the fuel cells, wherein the controller utilizes the switching circuit to switch to a more serial configuration if more heat is required and to switch to a more parallel configuration if less heat is required and wherein the controller iterates in a cycle of measuring fuel cell temperatures and reconfiguring the fuel cell system in a more parallel or more serial configuration in response to changes in temperature of the fuel cell system.

41. (previously presented) The fuel cell system of Claim 40, wherein the controller is configured to switch fuel cells from a series electrical arrangement to a parallel electrical arrangement to increase EMF efficiency and reduce fuel efficiency.

42. (previously presented) The fuel cell system of Claim 40, wherein the controller is configured to switch fuel cells between a series electrical arrangement that increases fuel consumption and heat production and a parallel electrical arrangement that decreases fuel consumption and heat production.

43. (canceled)

44. (previously presented) The fuel cell system of Claim 40, wherein the controller is configured to supply an excess amount of fuel to multiple fuel cells, to switch at least some of the fuel cells from a parallel electrical arrangement to a series electrical arrangement using the switching circuit, and to thereby produce heat from at least some of the excess amount of fuel.

45. (Previously Presented) The fuel cell system of Claim 40, wherein the controller is configured to supply a substantially constant amount of fuel to multiple cells within the fuel cell system, to switch at least some of the fuel cells from a series electrical arrangement to a parallel electrical arrangement, and to thereby increase EMF efficiency and reduce fuel efficiency.

IX. Evidence Appendix

(1). Declaration under 37 CFR 1.132 signed by inventors Kurt Ulmer and Peter Mardilovich. Copy attached.

X. Related Proceedings Appendix

None

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

Kurt Ulmer et al.

Application No. 10/674,053

Filed: September 29, 2003

For: Fuel Cell Modulation and Temperature Control

Group Art Unit: 1795

Examiner: LEWIS, Ben

DECLARATION UNDER 37 CFR §1.132

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, an undersigned inventor of the above-identified patent application, hereby declare the following.

At the time the invention of the above-identified patent application was made, I was an employee of Hewlett-Packard Co. working in the design of fuel cell systems. As such a professional, I am qualified to comment on the level of ordinary skill in this art.

U.S. Patent Application Publication No. 2003/0008184 to Ballantine

U.S. Patent Application Publication No. 2003/0008184 to Ballantine ("Ballantine") describes a "cogeneration fuel cell system" that "is operated among various modes **to balance heat and power demand signals**. In general, a fuel cell system is coupled to a power sink and a heat sink, and a controller is adapted to respond to data signals from the power sink and the heat sink." (Ballantine, Abstract) (emphasis added). Ballantine teaches "generating a heat demand signal when the thermal parameter of the heat sink is below a predetermined level; and . . . selectively connecting at least two fuel cells in the fuel cell stack ***in parallel in response to the heat demand signal***. (Ballantine, para. [0015]) (emphasis added). Similar language is contained in paragraph [0129] of Ballantine as well.

Further, Ballantine teach connecting fuel cells in parallel in response to a heat demand signal (e.g. in order to increase heat within a system) throughout the Ballantine reference. For example, Ballantine teaches that

> [i]n a first operating mode, the sections of cells are connected in series, and ***in a second operating mode, at least two sections of cells are operated in parallel***. In general, the first and second operating modes will provide different operating efficiencies in terms of the amount of heat produced per unit power. For example, ***the second operating mode may produce more heat***.

(Ballantine, para. [0090]) (emphasis added).

Further, Ballantine teaches that "the method may include selectively electrically connecting fuel cells in a low efficiency mode (e.g., ***some cells in parallel rather than in series***) in response to a control signal (e.g., a heat demand signal as from a thermostat) ***to provide additional heat*** into a fuel cell stack coolant fluid." (Ballantine, para. [0095]) (emphasis added). Similar language is contained in paragraph [0097] of Ballantine as well.

Finally, Ballantine teaches that "a group of ***fuel cells*** generally ***produce a greater amount of waste heat when they are connected in parallel rather than in series***. One

reason is that the cells generally operate at a lower efficiency in such a configuration, so that more waste heat is generated." (Ballantine, para. [0130]) (emphasis added).

<u>The Present Application</u>

Various independent claims of the present application are directed to a controller or other means that are configured to increase heat production by increasing fuel consumption by switching to a more serial configuration, and decrease heat production by decreasing fuel consumption by switching to a more parallel configuration. This, as is readily observed, is the exact opposite of what the Ballantine reference teaches.

Comparative test data included in Applicant's originally filed application as well as herein demonstrate that fuel cells electrically coupled in parallel decrease the amount of heat produced by a multiple fuel cell system, whereas fuel cells electrically coupled in series increase the amount of heat produced by a multiple fuel cell system.

Figs. 1 and 2 below depict two fuel cells electrically coupled in parallel and serial configuration, respectively.

200210246-02 (Our HP1-0659US)

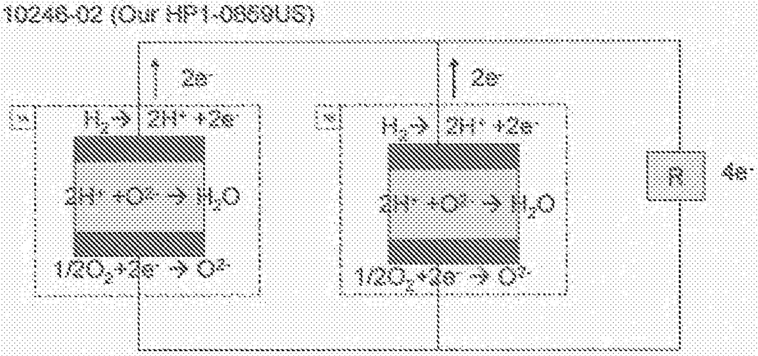

Figure 1. Parallel Configuration

overall chemical reaction of both cells together:

$2H_2 + O_2 \rightarrow 2H_2O$

2 mol of fuel consumed by system

System Conditions:

$V_T = V_{1A} = V_{1B}$
$I_T = I_{1A} + I_{1B}$

4 mol e- generated, 4 mol e- are doing work on load R

First, with regard to Fig. 1, depicting two cells connected in parallel, it can readily be demonstrated that cells labeled 1A and 1B are connected in parallel in relation to each other. The partial reactions at the anode and cathode are shown. In this configuration, it is demonstrated that the reactions produce 2 mol e- from each cell representing the current provided to the external load. One mole of hydrogen is consumed at each cell for a total of 2 mol indicated in the overall reaction. 2 mol protons, H+, are generated and react with oxygen to produce 1 mol of water at each cell. Two moles of fuel are consumed by the system. It is also important to notice that for a fixed power condition at the external load (constant current and voltage) that half of the current is supplied by each cell and the voltage drop across the load is equal to the voltage produced at each cell, which are also equal to each other by definition of a parallel circuit.

200210246-02 (Our HP1-0659US)

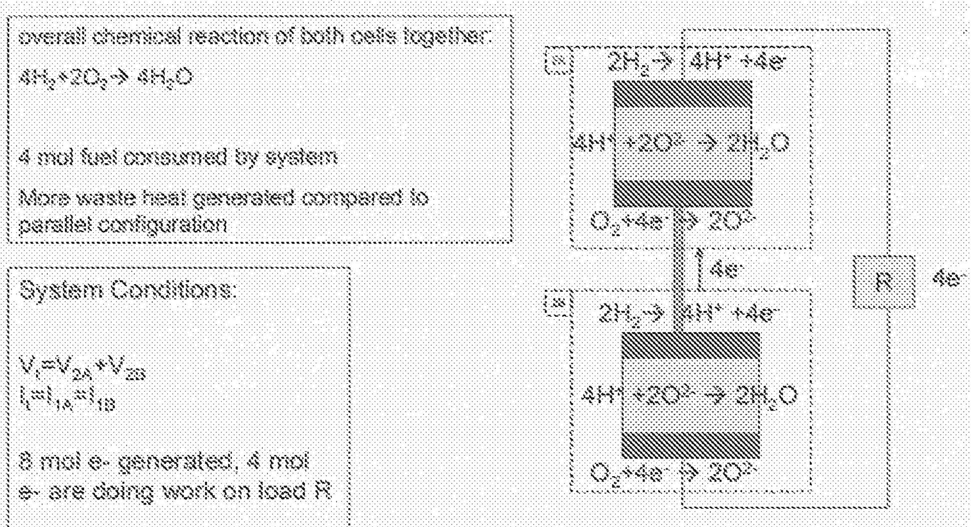

Figure 2. Series Configuration

With regard to Fig. 2, depicting two cells connected in series, for the same 4 mol e- supplied to the external load, each cell needs to produce 4 mol e- for a total of 8 mol e-.

The 4 mol e- generated by cell 2B are consumed by cell 2A rather than doing work on the external circuit. In this configuration, the fuel cells are running at a high current, low voltage regime. This series configuration consumes twice as much of the reactants and produces more waste heat for the same power (constant current and voltage) delivered to the external load.

In consideration of the figures filed with the present application, originally filed Figure 5A shows the current output capability for a series and a parallel configuration. At point 515, the current, voltage, and, thus, power output from the system (two cells either in series or parallel) is fixed. At this point (515) a switch from series to parallel configuration would be completely transparent to an external circuit. The difference is then only how much fuel is consumed and how much waste heat is generated in a given configuration. Thus, in relation to the arguments above, **a series configuration of two cells would require twice as much reactants and produce more waste heat as the parallel configuration**. The series configuration is the lesser efficient state.

Further, Applicants submit such comparative test data to show that the Ballantine reference is inoperable as described and/or claimed. Specifically, Ballantine makes statements about parallel and serial configuration that contradict what the present application has presented. Specifically, Ballantine states the following:

> Without wishing to be bound by theory, a group of fuel cells generally produce a greater amount of waste heat when that are connected in parallel rather than in series. One reason is that the cells generally operate at a lower efficiency in such a configuration, so that more waste heat is generated.

(Ballantine, para. [0130]).

Ballantine does not provide a physical explanation to support the above statement, but merely states that this is known in the art as follows:

> There are various fuel cell operating regimes that result in relatively low efficiency operation and the production of relatively high amounts of waste heat. Prior art systems are generally configured to avoid such regimes as a means of maximizing system efficiency. However, in systems balancing both heat demand and power demand signals, it may be desirable to switch between such modes. Other examples of low efficiency operating modes include reactant starvation, operation at temperatures outside the normal operating range of fuel cell, and producing a given a amount of power at low voltage and high current (e.g., cell voltages less thane 0.4 volts).

(Ballantine, para. [0018]).

Therefore, in light of Applicant's findings, the low voltage, high current, low efficiency mode described by Ballantine would correspond to a serial configuration and not a parallel configuration of fuel cells that Ballantine describes.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,

1/30/2009
DATE

Kurt M. Ulmer
Kurt Ulmer

DATE

David Champion

DATE

Gregory Hermon

04/30/09

DATE

Peter Mardilovich